## REMARKS

Claims 1-19 will be pending upon entry of the present amendment. Claims 14-19 are new. No new matter is presented. The Director is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090.

### Claim Rejections under 35 U.S.C. § 102

On page 2 of the office action, the Examiner rejected claims 1-5, 7-8 and 10-11 under 35 U.S.C. § 102(b) as being anticipated by *Wang* et al. (hereinafter referred to as *Wang*) (U.S. Patent No. 5,557,684). Applicants respectfully traverse.

With regard to claim 1, the Examiner contends that *Wang* discloses (col. 8, line 10) selecting a group of related data blocks from the picture. *Wang* states, col. 8, lines 10-13, "the processor uses a grid of r rectangular blocks each having dimensions of n-pixels by m-pixels, as a first estimate of coherent regions for frames 0 and 1 in the sequence." Applicants respectfully submit that *Wang* has not disclosed, "**selecting** a group of **related data blocks** from the plurality of data blocks of the picture," as claimed (emphasis added). *Wang* merely discloses using **all** the data blocks from a picture, where each data block is initially defined to be a rectangular array of pixels. Applicants submit that using all the blocks from the picture frame is **not** identical to selecting a group of related data blocks from a picture frame. *Wang* does not disclose a selection process, let alone a selection process directed to related data blocks.

In addition, the Examiner alleges that *Wang* discloses (col. 8, line 45), "determining a primary global motion vector for the selected group from all of the corresponding block motion vectors", as claimed. *Wang* discloses formulating an estimated motion model for each of the r rectangular blocks using an affine transformation for each of the rectangular blocks (col. 8, lines 12-49). *Wang* uses linear regression to fit each rectangular region with an affine transformation represented by the equations $V_x = a_{x0} + a_{x1}x + a_{x2}y$ and $V_y = a_{y0} + a_{y1}x + a_{y2}y$, where $V_x$ and $V_y$ are the components of the motion velocity vector of a pixel at a location (x,y) (col. 8, lines 16-24). *Wang* states, "[t]his is essentially plane-fitting in velocity space," (col. 8,

lines 43-44). Thus, the estimated motion model for each rectangular block is represented by an affine transformation. The affine transformation produces an estimated local motion for each pixel of each rectangular block. Applicants respectfully submit that determining estimated local motions for each pixel is not the same as "determining a primary global motion vector for the selected group from all of the corresponding block motion vectors," as claimed. In the present invention as claimed, the primary global motion vector is based upon block motion vectors for a selected group of related data blocks. In contrast, the affine transformation of *Wang* does not produce a single global motion vector, but instead produces a plurality of estimated local motions for each pixel in the rectangular block. In fact, Applicants respectfully submit that *Wang* does not disclose, suggest, or teach a system or method for determining a primary global motion vector from block motion vectors corresponding to a selected group of related data blocks.

Furthermore, the Examiner contends that *Wang* discloses (col. 9, line 7) classifying the block motion vectors from the selected group into a plurality of sub-groups. *Wang* discloses (1) selecting a number C of clustering centers from the r affine motion models that most confidently reflect local motion of the pixels comprising each rectangular block, (2) grouping together the affine models located within a certain radius of each clustering center, (3) averaging the parameters of the "grouped together" affine models to determine an affine model for each cluster, and (4) associating each pixel with the affine model that most closely resembles the pixel's local motion (col. 9, line 7 – col. 10, line 27). *Wang's* system is based upon local motion of individual pixels (i.e., associating each pixel with the affine model that most closely resembles the pixel's local motion). Applicants submit that *Wang* does not disclose a system or method for classifying a block motion vector for each data block in the selected group of related data blocks into a plurality of subgroups. That is, *Wang* neither discloses block motion vectors nor classifying block data vectors associated with related data blocks into subgroups. In contrast, *Wang* discloses local motion associated with each pixel.

In addition, the Examiner contends that *Wang* discloses (col. 8, line 62), "determining a plurality of secondary global motion vectors corresponding to the respective sub-groups from the block motion vectors classified in the respective sub-groups," as claimed. *Wang*

states, "[t]he affine parameter estimator 32 produces r motion models, one for each rectangular block ..." (col. 8, lines 62-63). Applicants fail to see how *Wang's* r motion models (i.e., the r affine transformations) are even remotely identical to a secondary global motion vector corresponding to a sub-group, where the secondary global motion vector is determined from the block motion vectors classified in the sub-group. As stated above, the affine transformations as disclosed by *Wang* merely determine an estimated local motion for each pixel. *Wang* does not disclose (1) a block motion vector that represents a data block (i.e., a group of pixels), (2) block motion vectors classified to a subgroup, and (3) a secondary global motion vector determined from the block motion vectors classified to the subgroup.

Finally, the Examiner alleges that *Wang* discloses (col. 10, line 42 and Fig. 6B '$V_0$'), "selecting the primary and/or at least one of the secondary global motion vectors for use in defining ... search windows for each block in the selected group to enable block matching with a reference picture," as claimed. First, as discussed above, Applicants submit that *Wang* does not disclose, teach or suggest a primary or a secondary global motion vector. In contrast, *Wang* discloses (1) a dense motion model (i.e. a motion vector is assigned to every pixel) and (2) affine models that generate estimated local motion at each pixel location (col. 5, lines 23 - 40).

Second, *Wang* discloses that affine parameters, clustering, and pixel assignment procedures are repeated in an iterative process to update regions of coherent motion of a picture frame, and these regions are then used in analyzing motions for the next pair of frames (col. 10, lines 37-44). Although *Wang* uses these updated regions as a starting point in analyzing motion for a next set of frames, *Wang* does not disclose selecting (or even using) a global motion vector to (1) define a search window, (2) define a search window for a block, or (3) define a search window for a block to enable block matching with a reference picture. Even if *Wang's* updated regions of coherent motion are identical to search windows (although Applicants maintain that they are not identical to search windows), *Wang* does **not** select a global motion vector for use in defining one or more search windows for a data block or disclose "block matching" with a reference picture, as claimed.

Based at least upon the above discussion, Applicants respectfully submit that claim 1 is not anticipated by *Wang*, and request that claim 1 be allowed.

With regard to claim 8, the Examiner contends that *Wang* discloses (col. 8, line 47) a method for analyzing global motion vectors and determining a metric representing a distribution pattern of the global motion vectors, and then based upon the distribution scheme, selecting a motion estimator scheme from a plurality of motion estimator schemes, where each motion estimator scheme has a different combination of search strategy and number of global motion vectors. However in contrast, *Wang* discloses comparing the local motion of each pixel in a region with an estimated pixel motion based upon an affine model for that region, in order to determine the variance of the local motion from the estimated motion given by the affine model (col. 8, lines 45-49). Although *Wang* discloses computing a variance of local pixel motion from pixel motion as estimated by a motion model (i.e., the affine model), as discussed above in conjunction with claim 1 Wang does not disclose or use global motion vectors. In fact, *Wang's* metric (i.e., the variance) is based not upon global motion vectors, but upon local and estimated pixel motions. Furthermore, the Examiner has not specifically shown where *Wang* discloses "selecting a motion estimator scheme on the basis of the distribution pattern metric … each having a different combination of search strategy and number of global motion vectors," as claimed. For at least these reasons and the reasons discussed above in conjunction with claim 1, Applicants submit that claim 8 is not anticipated by *Wang*, and respectfully request that claim 8 be allowed.

Although the language of claim 10 is not identical to that of claims 1 and 8, the allowability of claim 10 will be apparent in view of the above discussion.

With regard to claim 11, the Examiner alleges that *Wang* discloses (Fig. 6B) multiple motion estimators. However, Applicants respectively submit that Fig. 6B discloses a multi-step process of determining local motion for each pixel element of the frame (i.e., determining a dense motion model). In fact, Fig. 6B illustrates a three-level pyramid process by which the local-motion estimator 22 determines local motion of each pixel and assigns to each pixel a motion vector (col. 5, lines 62-64 and col. 7, line 63). *Wang* states, col. 5, lines 27 – 31, "the estimator assigns a motion vector to every pixel in the image. The result is an … dense motion model of the image … operations of the local motion estimator are discussed … with reference to FIGS. 5 and 6." Thus, although *Wang* discloses a **local-motion estimator**,

Applicants respectfully submit that *Wang* does not disclose a "**global motion estimator** coupled to receive *block motion vectors for data blocks* ... for generating ... global motion vectors for the picture, *each global motion vector being generated from a plurality of block motion vectors* ...," as claimed (emphasis added). For at least these reasons and the reasons discussed above in conjunction with claims 1 and 8, Applicants respectfully submit that claim 11 is not anticipated by *Wang*, and request claim 11 be allowed.

Claims 2-5 and 7 depend either directly or indirectly on claim 1. For at least the reasons discussed above in conjunction with claim 1, Applicants submit that claims 2-5 and 7 are not anticipated by *Wang*, and respectfully request that claims 2-5 and 7 be allowed.

Claim Rejections under 35 U.S.C. § 103

On pages 4-5 of the office action, the Examiner rejected claims 6 and 9 under 35 U.S.C. § 103(a) as being unpatentable over *Wang* in view of *Yagasaki et al.* (U.S. Patent No. 5,428,396), claim 12 under 35 U.S.C. § 103(a) as being unpatentable over *Wang* in view of *Mizuno et al.* (U.S. Patent No. 6,249,550), and claim 13 under 35 U.S.C. § 103(a) as being unpatentable over *Wang* in view *Yagasaki et al.* and further in view of *Mizuno et al.* Applicants respectfully traverse.

Claim 6 depends indirectly from claim 1, claim 9 depends directly from claim 8, and claims 12-13 depend either directly or indirectly from claim 11. Applicants respectfully submit that *Yagasaki et al.* and *Mizuno et al.* do not remedy the deficiencies of *Wang* as discussed above in conjunction with claims 1, 8 and 11. Thus, Applicants respectfully submit that claims 6, 9 and 12-13 are allowable based at least upon the reasons discussed above in conjunction with claims 1, 8 and 11, respectively, and request that the rejections to claims 6, 9 and 12-13 be withdrawn.

Conclusion

In light of the above amendments and remarks, Applicants respectfully submit that all of the claims pending in the application are now clearly allowable. Favorable consideration and a Notice of Allowance are earnestly solicited.

Respectfully submitted,

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